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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/605,130	09/10/2003	Bruce B. Doris	FIS920030283US1	2129
32074	7590	10/13/2004	EXAMINER	
INTERNATIONAL BUSINESS MACHINES CORPORATION DEPT. 18G BLDG. 300-482 2070 ROUTE 52 HOPEWELL JUNCTION, NY 12533			NHU, DAVID	
			ART UNIT	PAPER NUMBER
			2818	
DATE MAILED: 10/13/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/605,130

**Applicant(s)**

DORIS ET AL.

**Examiner**

David Nhu

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-14 is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>02</u> . | 6) <input type="checkbox"/> Other: _____  |



## **DETAILED ACTIONS**

### ***Election/Restrictions***

1. Applicant's election of Group II (Claims 1-14) is acknowledge.

Claims 1-14 are remained for examination. Accordingly, claims 15-20 are canceled/withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### **Drawings**

2. There is no description of layer **700** in figure 7.

### **Specifications**

3. Page 11, line 37, "the sacrificial polysilicon gate 300" should be -- the sacrificial polysilicon gate **210**-- See figure 4.

Page 12, line 28, "the substrate 200" should be --the substrate **100**-- See figure 6.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-11 are rejected under U.S.C 103(a) as being unpatentable over Kim (6,534,352 B1) in view of Fukada (6,300,206 B1).

**Regarding claim 1**, (see figures 2A-2H, col. 4, lines 5-67, col. 5, lines 1-36), Kim teaches a method of fabricating a field effect transistor (FET) having a metal gate structure 40 (see figure 2H) comprising: forming a metal gate structure 40 in an opening within a dielectric region 36

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formerly occupied by a sacrificial gate 37, said metal gate structure including a first layer 33 including one or more materials selected from the group consisting of metals and compounds of metals, said first layer contacting a gate dielectric 36, the gate dielectric contacting a transistor channel region formed in a semiconductor region of a substrate 21; forming a source region 34 and drain region 34 on opposite sides of said metal gate structure.

It is noted that Kim fails to teach an overlying silicide layer overlying said first layer.

However, Fukada, (see figure 15, col. 10, lines 27-56), teaches an overlying silicide layer 11, 12 overlying said first layer.

Regarding claims 2-11, Kim, col. 1-8, lines 1-67, Fukada, col. 1-20, lines 1-67, also teach the metal gate structure includes depositing a layer of silicon over said first layer, and reacting said deposited silicon with said deposited metal to form said overlying silicide layer in a self-aligned manner; wherein first layer consists of a single metal whose work function has a value at about the middle band-gap of silicon; wherein the single metal is tungsten; wherein the silicide is tungsten, cobalt, nickel; wherein the gate dielectric selected from the group consisting of silicon oxide, silicon nitride, silicon oxynitride; wherein the opening in said dielectric region is lined with dielectric spacers having been formed on sidewalls of said sacrificial gate; wherein said dielectric spacers include L-shaped oxide spacers having sidewall exposed at said opening and overlying nitride spacers.

It would have been obvious to one having ordinary skill in the art at the time of the present invention to apply the teachings of Fukada into the method of Kim as both are related to the same subject matter of fabricating an FET having a metal gate structure in a MOSFET device.

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### Allowable Claims

5. Claims 12-14 are allowed.

### Conclusion


6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Abiko'827, Huang'963, Burgener'823Chen'915, Reedy'648, Ho'046 are cited as of interest.

7. A shortened statutory period for response to this action is set to expired 3 (three) months and 0 (zero) day from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned (see 710.02 (b)).

8. Any inquiry concerning this communication on earlier communications from the examiner should be directed to David Nhu, (571)272-1792. The examiner can normally be reached on Monday-Friday from 7:30 AM to 5:00 PM. The examiner's supervisor, David Nelms can be reached on (703) 308-4910.

*The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7724.*

*Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956*

David Nhu 

October 10, 2004

